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1990

FOOD ENGINEERING

SINCE 1928, THE SOURCE ON PROCESSING, PACKAGING, AND PRODUCT DEVELOPMENT

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FOOD ENGINEERING

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There are many types of processing techniques in the food industry but some are more "leading edge" than others. This month *Food Engineering* takes a look at six emerging technologies and their effect on the industry.

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JESSE H. NEAL AWARD-WINNING PUBLICATION

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U.S. companies win international acclaim

Three U.S. food products won recognition from an international panel of trade press editors who judged the products based on polls conducted with distributors and consumers. The Sial D Ór awards are presented on alternate years to the best products of 17 countries.

Denmark was the only other country to win three awards; the rest of the countries picked up either one or two. **Oscar Mayer Foods Corp.**, Madison, WI won honors for its Lunchables packaged cold cuts, cheese and cracker combinations.

Oscar Mayer's Lunchables was one of the winners of the international Sial D Ór awards.

Micro Cups from **George A. Hormel & Co.**, Austin, MN was recognized for providing microwaveable meals on the run: twelve different sh.elf-stable entrees and seven different soups. St. Louis-based **Anheuser-Busch, Inc.** was honored for Michelob Dry.

Western products are a hit in Singapore

Singapore is a thriving market that is willing to try U.S. food products, once they are familiar with them, according to the U.S. Department of Agriculture (USDA) Foreign Agricultural Service.

The Southeast Asian nation **imports $3.5 billion** annually in agricultural products which includes U.S. meats, poultry, apples, oranges and grapes. Pears are being introduced, but Singaporeans are used to local varieties and the USDA suggests a consumer education program is needed. As in the U.S., more women in Singapore are entering the work force outside of the home and there is an increased demand for high-quality microwaveable and convenience foods.

Packaging equipment exports show strong growth

U.S. sales of packaging equipment **jumped almost 27 percent** from 1988 to more than $500 million 1989, according to the U.S. Department of Commerce (DOC). At the same time, processing equipment exports dropped 19 percent to $412.4 million in 1989, the DOC reported. The top buyers of U.S.-produced packaging and processing equipment include: Canada, Mexico, the United Kingdom (UK), Japan and South Korea.

Food processing/packaging equipment exports, exports ($ million)

Machinery	1988	1989	% change
Processing equipment imports	323.4	327.7	+1.3
Packaging equipment imports	634.4	596.9	- 5.9
Processing equipment exports	509.1	412.4	-19.0
Packaging equipment exports	395.0	500.4	+26.7

Source: U.S. Department of Commerce.

Packaging equipment exports jumped over 25 percent of 1988's sales in 1989.

Meanwhile, processing equipment imports increased a little over one percent to $327.7 million while packaging equipment imports dropped nearly six percent to almost $597 million. The U.S. buys most of its food processing equipment from West Germany, Japan, Italy, the Netherlands and the UK.

our customer's expectations [needs and wants] will require changes and/or improvements to the 'system' with which we work. We need to first determine what our customer's expectations are. Then we need to commit to eliminating the barriers, solving the problems, making the improvements or initiating the changes that allow us to met the expectations. The process is continual because (1) the goal is 100 percent conformance [not 99 percent] and (2) customer expectations will change over time."

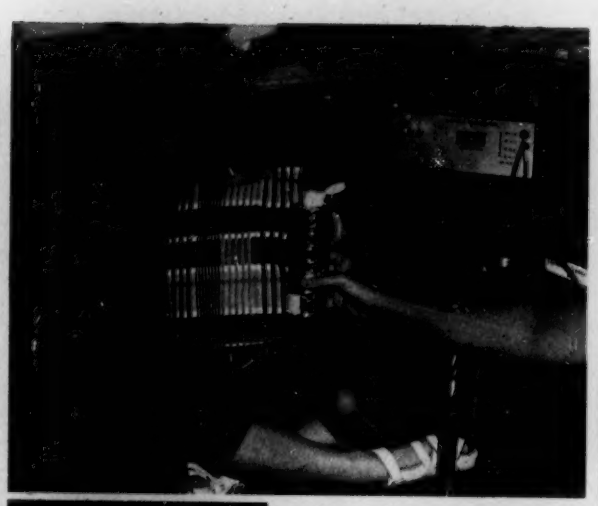
Huff pointed out that unless people strive for 100 percent conformance or zero defects, they will never achieve it. While errors occur, it is necessary to identify them and improve the system to eliminate the cause.

McCormick & Co., Inc., 230 Schilling Circle, Hunt Valley, MD 21031

Circle 203

Monell Center pushes frontiers of taste and smell research

How our senses of taste and smell interact with flavors continues to baffle science. But, by understanding the workings of receptors in taste cells, compounds could be custom-designed to yield an endless variety of flavors. This is just one of the areas researchers study at the Monell Chemical Senses Center in Philadelphia.



On a recent visit by *FE* to Monell, Mark Friedman, assistant director and head of the nutrition program, discussed some of Monell's projects.

While we often take our senses of taste and smell for granted, they have a significant effect on our eating habits and the success or failure of a change in diet.

For example, individuals who must restrict their salt intake initially find it difficult to break the salt habit. The misery may not be worth it, because research shows that salt added during cooking or at the table equals less than ten percent of total salt intake.

In addition, physicians in the future may instead examine the individual's calcium intake since recent Monell research with rats suggests that a diet deficient in calcium might contribute to an increased desire for salt.

In one study of non-nutritive sweeteners, Monell found that people drinking large amounts of aspartame-flavored beverages successfully lost weight. However, chewing aspartame-flavored gum increases the appetite since the act of chewing stimulates digestive juices and expectations for food.

Everyone knows that people often are cautious about trying new foods. However, little is known about how to overcome an initially negative reception to an exotic dish. Monell researchers found that when people are informed in advance about a food's taste, they show greater willingness to try it. But providing nutritional information has no effect in winning a trial taste, even in the age of "nutritional consciousness." (However, the study subjects ranged in age from three to 22, a group not noted for its concern for nutrition. In the future, tests will use older subjects, said Monell researcher, Marcia Levin Pelchat.)

Besides trying to discover the secrets of the human appetite, Monell researchers are also trying to figure out how to fatten up catfish faster to increase productivity and reduce feed waste.

Monell attracts visiting scientists from all over the world, including the USSR, China, and Japan. And the center has trained more than 250 scientists.

Impact of fat substitutes in Europe will vary by country

Europe presents a smorgasboard of fat consumption and the potential success of fat substitute products will vary by nation, according to Experience, Inc., an international agribusiness consulting firm with offices in Minneapolis and Washington, DC, in conjunction with the Swiss consulting firm, Consultex of Geneva.

For example, daily per capita calorie consumption is over 3,800 in Ireland and less than 3,200 in Portugal. West Germany leads the rest of Europe in terms of fat consumption with per capita consumption of 80 pounds. German health officials have set goals to lower saturated fat con-

sumption which many Germans seem to be following. Market share for low-fat products increased from 4.1 percent in 1983 to 9.1 percent in 1988, according to Experience.

The United Kingdom's annual per capita fat consumption is 72 pounds and is taking a beating. About half of UK shoppers claim to watch labels for fat, sugar and calorie content.

Meanwhile back in the USSR, fat consumption remains steady at 50 pounds per capita and shows no sign of abating. Other Eastern European countries have a diet higher in fat than the USSR, at a per capita consumption of 58 pounds. Along with the USSR, these countries are also unlikely markets for fat substitutes.

U.K.	72
France	60
West Germany	80
U.S.	75
U.S.S.R.	50
Eastern Europe	58
Japan	40

Source: Experience, Inc.

▲ West Germany leads the world in fat consumption, followed closely by the US and UK.

American Maize recently reported on the regulatory status of cyclodextrin. In the U.S., the company opened a master file for beta cyclodextrin with the FDA (master file #337). This was followed by a draft food additive petition, with formal filing to follow shortly. While new studies of the biochemistry and toxicology of beta cyclodextrin are required to obtain FDA approvals, summaries of earlier findings on the toxicology of cyclodextrins can be obtained from American Maize.

In France, beta cyclodextrins (obtained by the enzymatic process) have been approved by the Superior Council of Public Health of France, and the National Academy of Medicine. They may be used as a carrier for flavors.

In the Netherlands, beta cyclodextrin was declared to be an enzymatically modified starch. As such, it is permitted as a raw material for the preparation of foods.

The Food Administration of Denmark permits the application of cyclodextrin as a carrier material for flavor compounds. Approvals for various levels of beta cyclodextrin have also been reported in Luxembourg, Spain, Belgium and Germany.

In Japan, the cyclodextrins are listed as natural food additives and commercial applications within the Japanese food industry was initiated early in the 1980s.

A line of *Cavitron Cyclo-Dextrin* products is currently available for commercial sale from American Maize.

American Maize-Products Co., 1100 Indianapolis Blvd., Hammond, IN 46320 **Circle 207**

Improved spice technology to result from acquisition

German-based Fuchs GmbH acquired Baltimore Spice in late July. Lou Greis, president of Baltimore Spice, Owings Mills, MD, said he was pleased with the move since it will result in Baltimore Spice having access to Fuchs' proprietary microencapsulation process. While encapsulating oils derived from spices is nothing new, microencapsulation enrobes the spice itself as it is being ground. In addition, the process reduces bacteria levels without the need for chemical processing and shelf life is extended.

The appearance of the spice looks similar to conventionally-processed spices. Various types of coatings are used, Greis said, including maltodextrins. He also said the merger would allow the two companies to share markets and raw product sources.

Baltimore Spice, P.O. Box 5858, Baltimore, MD 21208 **Circle 204**

Enzyme modified cheese and dairy flavors

Enzyme modified cheese and dairy flavors are examples of the technological advances made to provide more natural flavors. Speaking at a conference on fat and cholesterol-reduced foods (co-sponsored by International Business Communications, South Natick, MA, and *Food Engineering*), Dr. Peter R. Freund, manager of product applications for Chr. Hansen's Laboratory, Inc., discussed the advances made in this area, and the wide range of products available.

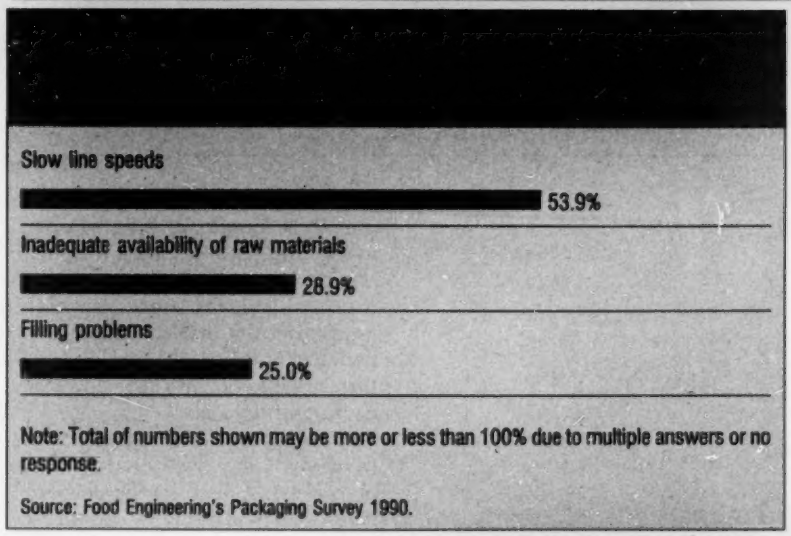
Shown (on page 40) is an enzyme action scheme for flavor and textural development of aged cheddar cheese. Alternatives for the use of natural cheeses as flavors are: high flavor intensity natural cheeses; enzyme modified cheeses (EMCs); and natural flavors, explained Freund.

High flavor intensity natural cheese is tradi-

PLASTICS STRETCH IN NEW DIRECTIONS

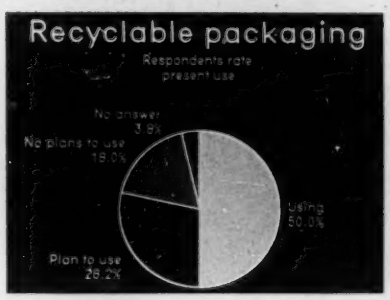
Demands for better barriers, the green revolution and challenges from foodservice don't stifle innovative ways of packaging food.

PATRICIA M. DILLON
SENIOR ASSOCIATE EDITOR


Slow line speeds
53.9%
Inadequate availability of raw materials
28.9%
Filling problems
25.0%
Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.
Source: Food Engineering's Packaging Survey 1990.

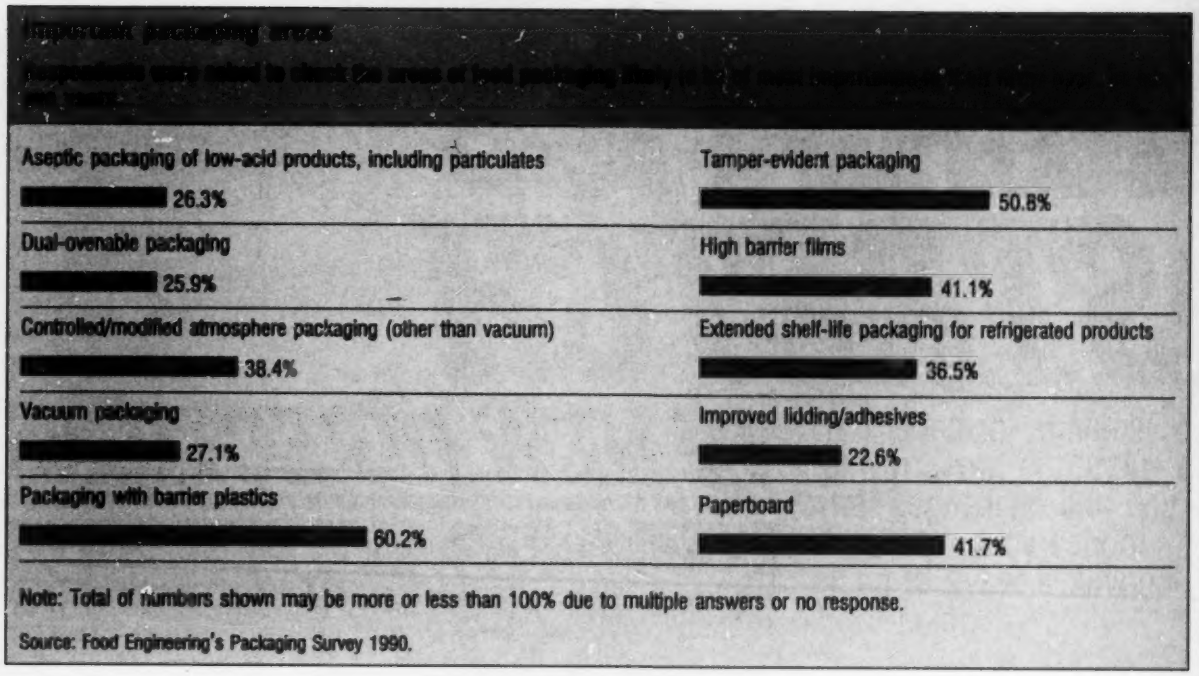
Results from *Food Engineering's* Annual Packaging Buyers Survey are in and for the fifth year in a row, the food industry is calling for better barrier plastics. Approximately 60 percent of the more than 500 members of the Executive Advisory Board voted barrier plastics most important as a packaging concern. Barrier films still have a long way to go to satisfy food processors. Requests included:

- "A plastic polymer, extrudable for films or rigid containers which is reusable or recyclable and has an oxygen and water barrier approaching glass. Polymer should also be resistant to heat deformation under retort conditions and of course, acceptable to the FDA."—a packaging consultant from the South.
- "High barrier, clear plastic material for bottles which could be used as a monolayer to make it easily recyclable. Oxygen and moisture barrier to equal three times that of polyethylene terephthalate (PET)."—lab manager at a major food processor.
- "Greater development of plastic containers that can take pressure and heat."—Midwest food processor.
- "Cost-effective fat barrier with better material toughness. Current polypropylene barrier is too brittle" and doesn't do the job.—president of Wisconsin food company.



As the preceding comments demonstrate, the desire for better plastic is coupled with environmentalism. Food manufacturers want packaging that withstands the rigors of process-

PACKAGING BUYERS SURVEY



ing and distribution yet won't accumulate in America's landfills. From a marketing standpoint, it's smart to think green and panelists are increasingly calling for more recyclable packaging materials. Almost every panelist mentioned recyclability in the same breath with the rest of their packaging requests.

A tongue-in-cheek request isn't far from what the industry wants: "Barrier packaging material for perishable foods that will literally self-destruct within months of being removed from a refrigerated environment."

Our panelists reported that more of their customers are concerned with source reduction–cutting down on the amount of packaging at the source. Shrink-wrapped tray packs are alternatives to the typical cardboard case. While panelists want less material, they are not willing to sacrifice attractive graphics and container stability. Panelists feel containers can be made that are light-weight yet retain sidewall strength and offer acceptable "feel" to the consumer.

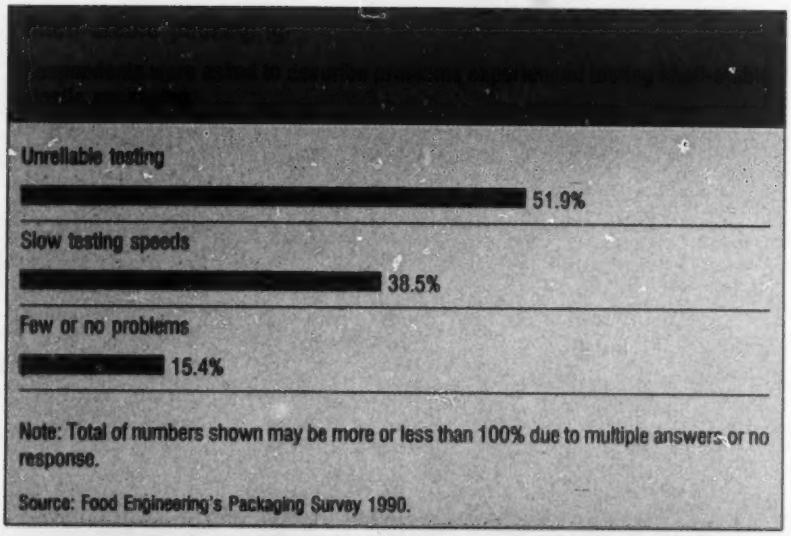
Only a few panelists feel biodegradability is a viable option. Perhaps because this solution is largely mythical since landfills don't offer exposure to the necessary sunlight and air needed to breakdown waste.

Foodservice challenges

Along with the green revolution, foodservice is making new demands on packaging. Last year, consumers spent $243.3 billion, almost 47 percent of their food dollars, on foodservice. And just over half of our respondents, 53.4 percent, say they package for food service. Product integrity and appearance were the most important customer requirements, beating factors such as convenience and cost. Meat, canned, and frozen food manufacturers had a slightly higher average in supplying foodservice.

A healthy 73.4 percent of the panelists confirmed that fresh prepared departments in supermarkets are creating a need for new packaging. "Containers in the fresh prepared departments definitely need more developments for less oxygen transport, for example, tighter seals with gas packaging," said a Wisconsin techni-

PACKAGING BUYERS SURVEY



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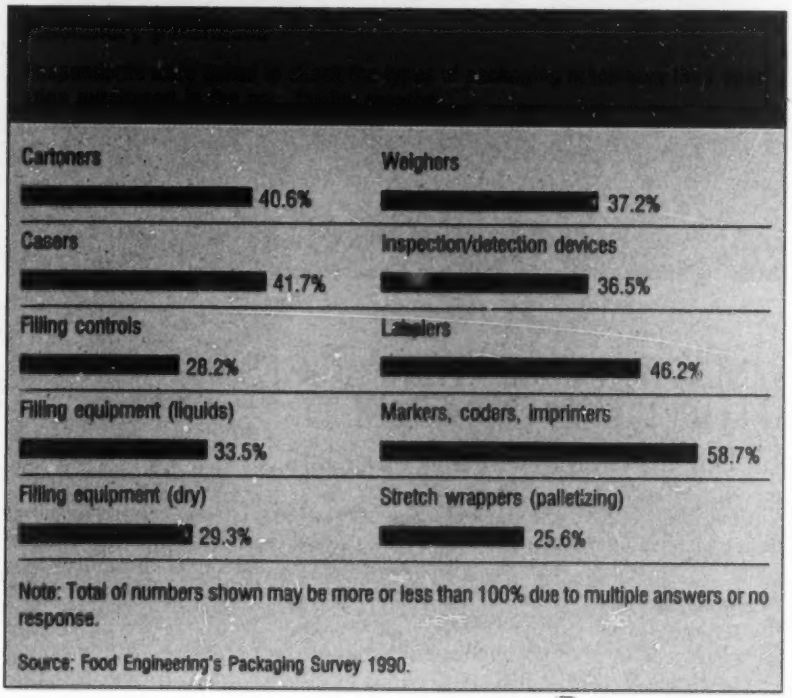
Source: Food Engineering's Packaging Survey 1990.



Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.

Source: Food Engineering's Packaging Survey 1990.

cal director. He raises questions on the availability of paperboard containers for wet retail products and wonders if "an acid-resistant, polycoated paperboard container with heat-seal closure would offer an advantage over plastic containers for acidic products." (In the interest of recycling, there has been an increased call for paperboard tubs to replace plastic tubs for prepared salads and other refrigerated products.) Other panelists asked for deli/foodservice packaging that can handle abuse without leaking yet doesn't require a contortionist to open. And a bread baker made a simple request for bread packaging that offers better crush resistance.

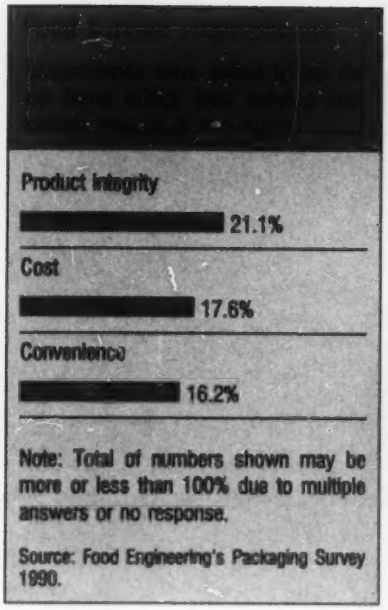
It's only logical that controlled/modified atmosphere packaging (CAP/MAP) followed barriers in importance since CAP/MAP depends on good barrier films. Respondents want simplified MAP systems and easy-opening CAP systems. A sausage manufacturer reported that his company is switching from vacuum packaging to MAP film tray packs to improve the appearance of the product. Another respondent wants more from vacuum packaging as indicated by his request for films that will allow fresh beef cuts to keep their color while incorporating extended shelf life. A new twist is thrown in by a Northeast purchasing agent who wants packaging material that is a good oxygen barrier and is also edible.

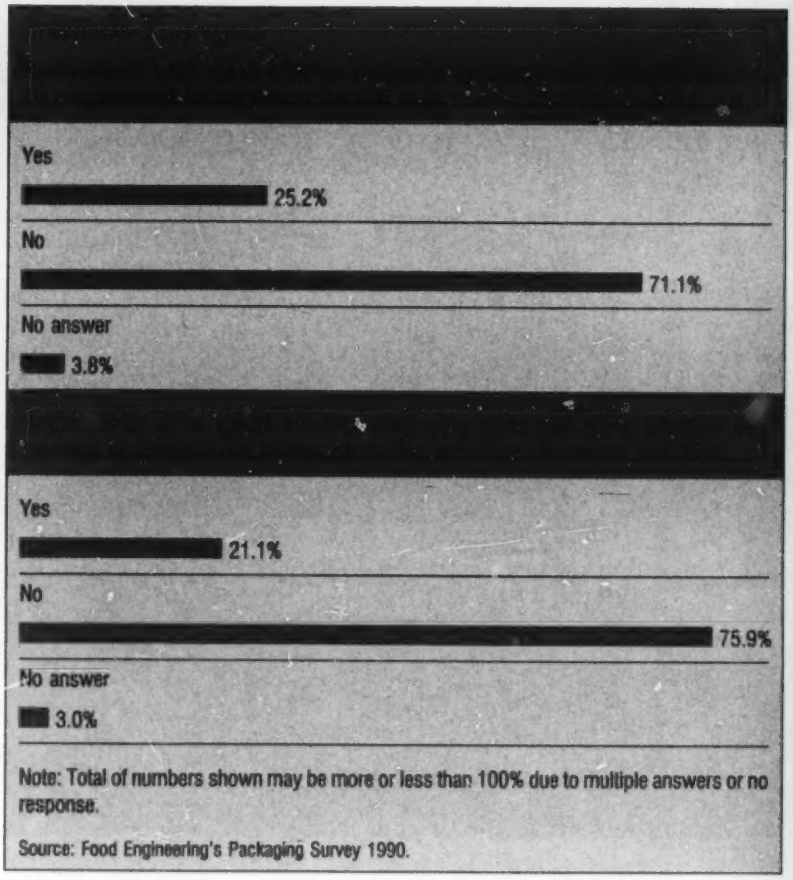
Speed at no extra cost

Like manufacturing managers in every industry, our survey respondents, in discussing machinery, complained most about slow line speeds. Almost 54 percent said slow line speeds were the biggest impediment in the manufacture of microwaveable foods, followed by inadequate availability of packages/raw materials (28.9 percent) and filling problems (25 percent). A frustrated dairy specialist is in dire need of a "low-acid aseptic high-speed plastic container line." He quipped that the current line's unreliability, regulatory implications and his company's marketing department ignorance of cost, made him look forward to retirement.

Speed at no additional cost is the answer to the prayers of other respondents. Quick-change machine tooling, robotic changeover, and increased modularity of packaging lines to facilitate daily line reconfigurations were requested—all at no additional cost.

PACKAGING BUYERS SURVEY


Product integrity
21.1%
Cost
17.6%
Convenience
16.2%
Note: Total of numbers shown may be more or less than 100% due to multiple answers or no response.
Source: Food Engineering's Packaging Survey 1990.



During the last year, more labelers, markers, coders, and imprinters were bought over other packaging equipment. However, this equipment also earned numerous complaints regarding the quality of printing–it needs to be improved. This falls in step with the aforementioned emphasis on product appearance.

Packaging of tomorrow

Looking toward the future: A good 39 percent of our panelists indicated that their firms are investigating the possibility of making significant changes in packaging over the next year. This becomes evident by requests:

- A beverage manufacturer asked for a "dual compartment container for two different liquid systems which will have a device so that the two liquids will be allowed to intermix just prior to pouring."
- A New Jersey food scientist wants "a transparent, edible, barrier material which can be applied as a liquid and peeled away or dissolved in water hotter than 140°F."
- Edible film packing for meat and chicken products that can be applied by spray is on the wishlist of a Chicago director of R&D.
- An ice cream manufacturer wants a collapsible accordion-like container that would allow the container to be compressed as the ice cream is consumed. Minimizing dead air space reduces freezer burn from occurring and damaging the product.

FE's Packaging Buyers Survey costs $125 and is available by contacting Anne Hartnett at (215) 964-4444 or fax (215) 964-4273. ▲